

Listing of Claims:

1. (Currently Amended) An optical DNA sensor comprising:
a solid imaging device ~~, and~~ which is configured to have a
plurality of types of DNA ~~probe~~ probes each including a different
nucleotide sequence ~~and being~~ arrayed and fixed on a surface of
5 the solid imaging device;

a plurality of photoelectric elements provided in the solid
imaging device; and

a transparent conductive layer which is provided in the
solid imaging device between the DNA probes and the plurality of
10 photoelectric elements, and to which a voltage is applied to
attract a nucleotide strand.

Claims 2 and 3 (Canceled).

4. (Currently Amended) The optical DNA sensor as claimed in
claim ~~2~~ 1, wherein each of the photoelectric elements ~~is of~~
comprises a field effect transistor ~~type having~~ which has a
semiconductor layer ~~which~~ that generates electric charges by
5 receiving light.

5. (Currently Amended) An optical DNA sensor comprising:
a solid imaging device,

an ~~excited~~ exciting light absorbing layer which absorbs
exciting light, and which is formed on a surface of the solid
5 imaging device, and which is configured to have a plurality of
types of DNA ~~probe~~ probes each including a ~~which include~~
nucleotide sequence ~~and are~~ aligned and fixed on the ~~excited~~
exciting light absorbing layer,

a plurality of photoelectric elements provided in the solid
10 imaging device, and

a transparent conductive layer which is provided in the
solid imaging device between the DNA probes and the plurality of
photoelectric elements, and to which a voltage is applied to
attract a nucleotide strand.

6. (Currently Amended) An optical DNA sensor comprising:

a solid imaging device ~~, a transparent conductive layer~~
~~which is formed on a surface of the solid imaging device and has~~
~~a charge density of 1.0×10^{20} [1/cm³] or less, and~~
5 which is configured to have a plurality of types of DNA ~~probe~~
probes each including a ~~which include~~ nucleotide sequence ~~and are~~
aligned thereon;

a plurality of photoelectric elements provided in the solid
imaging device; and fixed on the

10 a transparent conductive layer which is provided in the
solid imaging device between the DNA probes and the plurality of
photoelectric elements, and to which a voltage is applied to
attract a nucleotide strand, wherein the transparent conductive
layer has a charge density of 1.0×10^{20} [cm⁻³] or less.

7. (Currently Amended) An optical DNA sensor comprising:
a solid imaging device;

5 a dielectric multilayered film comprising a plurality of
types of dielectric layers ~~with~~ each having refractive indexes
different from each other, wherein the dielectric layers which
are alternately laminated on a surface of the solid imaging
device ~~[[,]]~~ and an optical film thickness of each of the
dielectric layers ~~being~~ is equivalent to one fourth of a
wavelength of a phosphor-exciting light, ~~[[;]]~~ and wherein the
10 dielectric multilayered film is configured to have a plurality of
types of DNA ~~probe~~ probes each including a ~~which include~~
nucleotide sequence ~~and are aligned and fixed on the dielectric~~
~~multilayered film thereon;~~

15 a plurality of photoelectric elements provided in the solid
imaging device; and

a transparent conductive layer which is provided in the
solid imaging device between the DNA probes and the plurality of

photoelectric elements, and to which a voltage is applied to attract a nucleotide strand.

8. (Currently Amended) An optical DNA sensor comprising:

a solid imaging device ~~comprising:~~ having a transparent substrate;

a plurality of photoelectric elements which are arranged
5 apart from each other on a surface of ~~a~~ the transparent substrate
and which include a bottom gate electrode ~~21~~ having a shading
property, a semiconductor layer having a light sensitivity, and a
light-transmissive top gate electrode, wherein the bottom gate
electrode, the semiconductor layer and the light-transmissive top
10 gate electrode ~~which~~ are layered in order on the transparent
substrate; ~~in this order; and~~

a light-transmissive protective layer ~~for coating~~ which
coats the plurality of photoelectric elements, ~~[[;]]~~ and which is
configured to have a plurality of types of DNA ~~probe~~ probes each
15 including a ~~which include~~ nucleotide sequence ~~and are~~ aligned and
fixed ~~on the protective layer~~ thereon; and

a transparent conductive layer which is provided in the
solid imaging device between the DNA probes and the plurality of
photoelectric elements, and to which a voltage is applied to
20 attract a nucleotide strand.

9. (Currently Amended) A DNA reading apparatus comprising:
an optical DNA sensor comprising a solid imaging device ~~7~~
~~and which is configured to have a plurality of types of DNA probe~~
~~probes~~ each including a nucleotide sequence ~~and being~~ arrayed and
5 fixed on a surface of the solid imaging device; and

a driving unit which is attachable to and detachable from
the optical DNA sensor ~~for attaching the optical DNA sensor~~
~~detachably and for driving~~ to drive the solid imaging device;

wherein the solid imaging device comprises a plurality of
10 photoelectric elements, and a transparent conductive layer which
is provided between the DNA probes and the plurality of
photoelectric elements, and to which a voltage is applied to
attract a nucleotide strand.

10. (Currently Amended) A DNA reading apparatus comprising:
an optical DNA sensor which comprises:

a solid imaging device ~~which comprises:~~ having a
transparent substrate;

5 a plurality of photoelectric elements which are
arranged apart from each other on a surface of ~~a~~ the transparent
substrate and which include a bottom gate electrode having a
shading property, a semiconductor layer having a light
sensitivity, and a light-transmissive top gate electrode, ~~which~~
10 wherein the bottom gate electrode, the semiconductor layer and

the light-transmissive top gate electrode are layered in order on the transparent substrate; ~~in this order;~~ and

15 a light-transmissive protective layer ~~for coating~~ which coats the plurality of photoelectric elements, ~~[[;]]~~ and which is configured to have a plurality of types of DNA ~~probe~~ probes each including a ~~which include~~ nucleotide sequence ~~and are~~ aligned and fixed ~~on the protective layer~~ thereon; and

20 a transparent conductive layer which is provided in the solid imaging device between the DNA probes and the plurality of photoelectric elements, and to which a voltage is applied to attract a nucleotide strand; and

25 a light irradiation member ~~for irradiating~~ which irradiates ~~a phosphor exciting light like a plane of light~~ toward a rear surface of the transparent substrate of the ~~optical DNA sensor~~ solid imaging device.

11. (Original) A DNA reading apparatus as claimed in claim 10, wherein the light irradiation member is disposed below the optical DNA sensor.

12. (Currently Amended) A DNA reading apparatus as claimed in claim 11, wherein the light irradiation member irradiates the phosphor exciting light to the DNA ~~probe~~ probes through the solid imaging device.

13. (Currently Amended) A DNA reading apparatus as claimed in claim 11, wherein the light irradiation member irradiates both the plurality of types of DNA probes and the solid imaging device, ~~the DNA probe is able to bond to an appropriate sample~~
5 ~~DNA having a fluorescent substance, the fluorescent substance is excited by the phosphor exciting light and emits a light is different in wavelength from the phosphor exciting light, and the phosphor exciting light of~~ irradiated by the light irradiation member ~~having~~ has a wavelength in a range which excites a
10 fluorescent substance that labels a sample DNA bondable to an appropriate one of the DNA probes but ~~makes difficult for exciting~~ does not sufficiently excite the solid imaging device in comparison with the light emitted from the fluorescent substance.

Claims 14-16 (Canceled).

17. (Currently Amended) A DNA reading apparatus as claimed in claim 12, wherein the light irradiation member irradiates both the plurality of types of DNA probes and the solid imaging device, ~~the DNA probe is able to bond to an appropriate sample~~
5 ~~DNA having a fluorescent substance, the fluorescent substance is excited by the phosphor exciting light and emits a light is different in wavelength from the phosphor exciting light, and the phosphor exciting light of~~ irradiated by the light irradiation

10 member ~~having~~ has a wavelength in a range which excites a
fluorescent substance that labels a sample DNA bondable to an
appropriate one of the DNA probes ~~makes difficult for exciting~~
but does not sufficiently excite the solid imaging device ~~in~~
~~comparison with the light emitted from the fluorescent substance.~~